

# Starter

A circle with centre  $C$  has equation  $x^2 + y^2 - 10y + 20 = 0$ .

- (a) By completing the square, express this equation in the form

$$x^2 + (y - b)^2 = k \quad (2 \text{ marks})$$

- (b) Write down:

(i) the coordinates of  $C$ ; (1 mark)

(ii) the radius of the circle, leaving your answer in surd form. (1 mark)

- (c) A line has equation  $y = 2x$ .

(i) Show that the  $x$ -coordinate of any point of intersection of the line and the circle satisfies the equation  $x^2 - 4x + 4 = 0$ . (2 marks)

(ii) Find any points of intersection and explain what this means  
(2 marks)

E7

Solve simple trigonometric equations in a given interval, including quadratic equations in  $\sin$ ,  $\cos$  and  $\tan$  and equations involving multiples of the unknown angle.

Assessed at AS and A-level

Teaching guidance

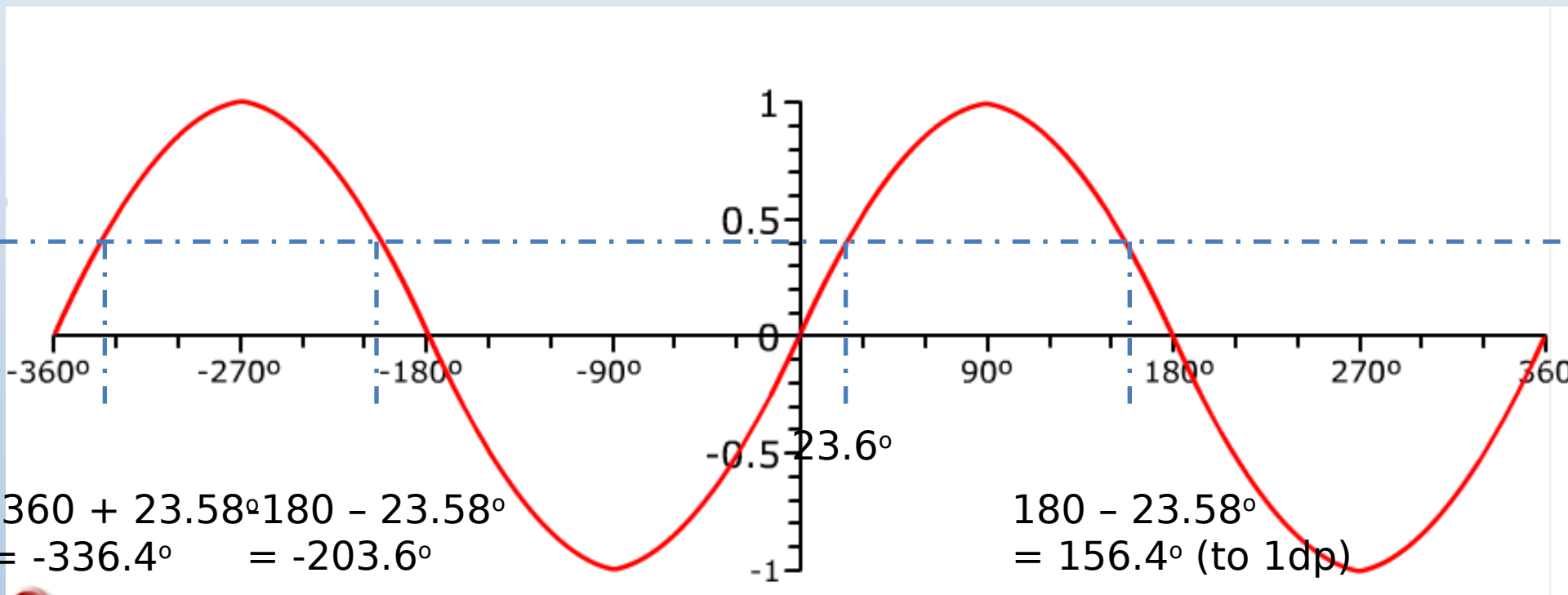
Students should be able to:

- understand and solve simple trigonometric equations
- answer questions that require them to give solutions in degrees.

# 3.1 Sine, cosine and tangent

**$\sin x = 0.4$  in the range  $-360^\circ \leq x \leq 360^\circ$   
our answer to 1dp.**

Principle Value:  $\sin^{-1}(0.4) = 23.58^\circ$



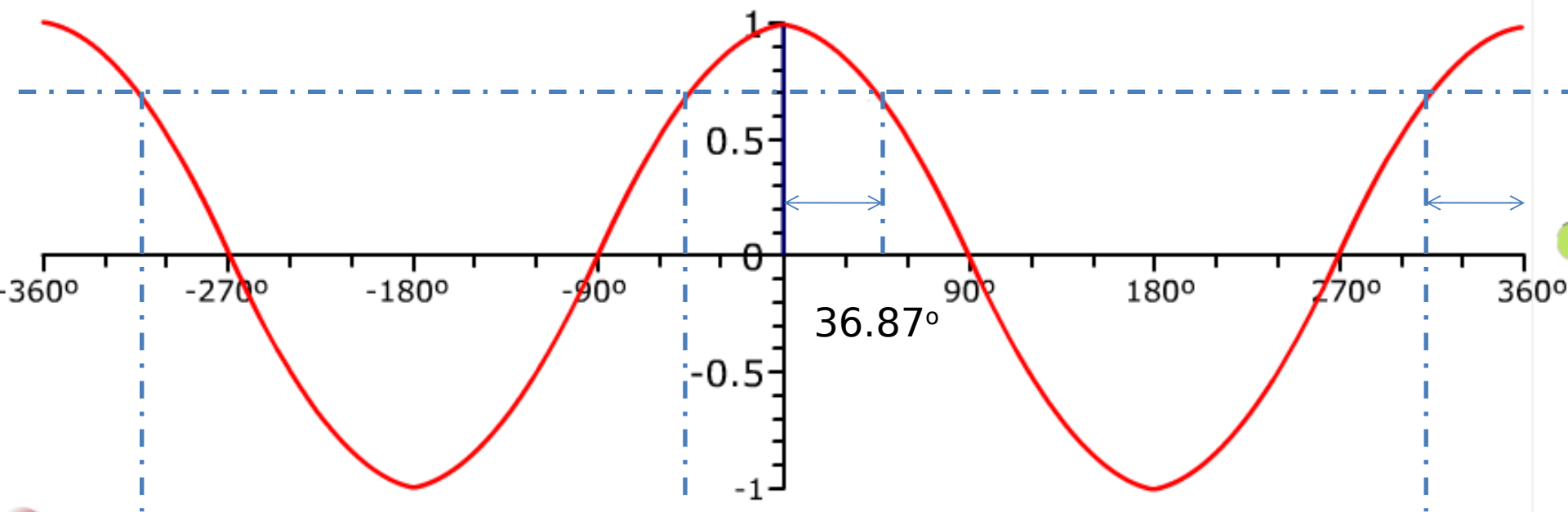
$$x = \{-336.4^\circ, -156.4^\circ, 23.6^\circ, 156.4^\circ\}$$

# 3.1 Sine, cosine and tangent

**Solve  $\cos x = 0.8$  in the range  $-360^\circ \leq x \leq 360^\circ$ .**

**Give your answer correct to 2dp**

Principal value:  $\cos^{-1}(0.8) = 36.87^\circ$



$$\begin{aligned} -360 + 36.87^\circ \\ = -323.13 \end{aligned}$$

$$\begin{aligned} 0 - 36.87 \\ = -36.87^\circ \end{aligned}$$

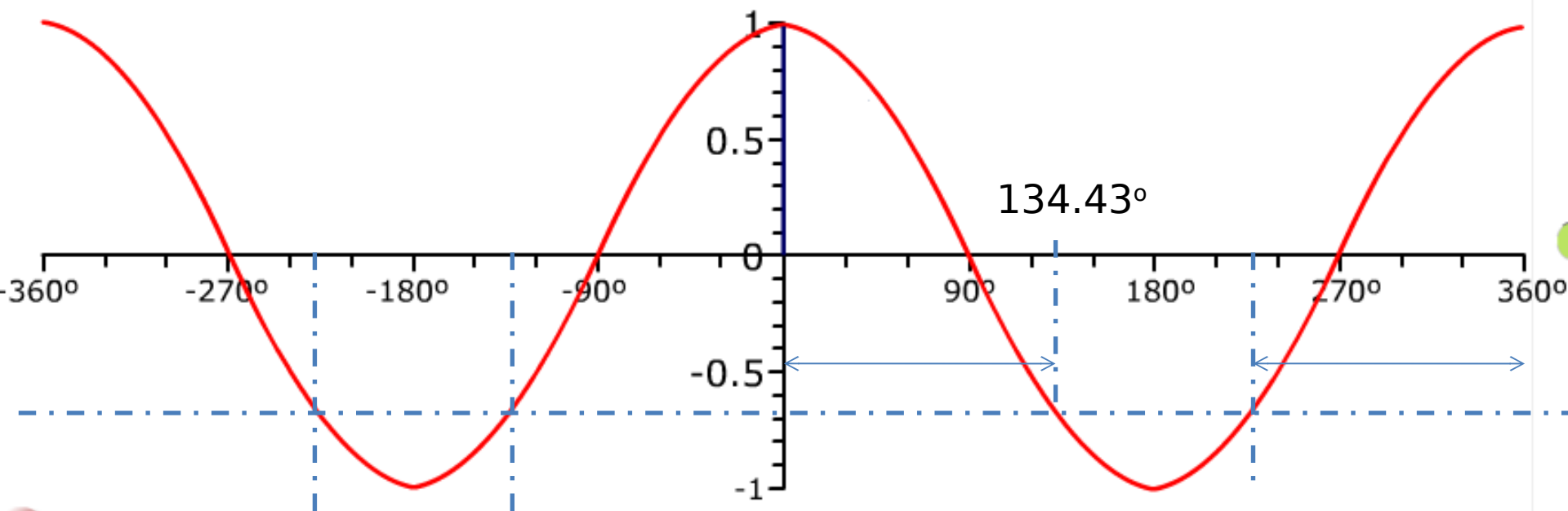
$$\begin{aligned} 360 - 36.87^\circ \\ = 323.13^\circ \end{aligned}$$

# 3.1 Sine, cosine and tangent

**Solve  $\cos x = -0.7$  in the range  $-360^\circ \leq x \leq 360^\circ$ .**

**Give your answer to the nearest  $0.1^\circ$**

Principle value:  $\cos^{-1}(-0.7) = 134.43^\circ$



$$\begin{aligned} -360 + 134.43^\circ \\ = -225.57 \end{aligned}$$

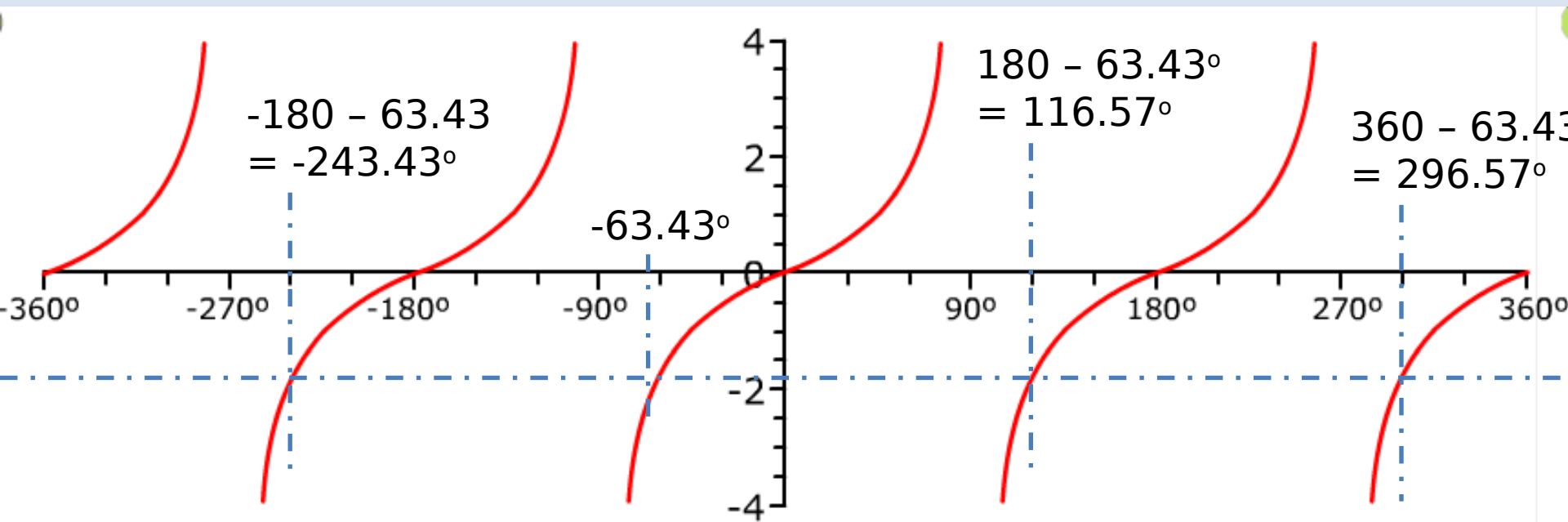
$$-134.43$$

$$\begin{aligned} 360 - 134.43^\circ \\ = 225.57^\circ \end{aligned}$$

$$x = \{-225.6^\circ, -134.4^\circ, 134.4^\circ, 225.6^\circ\}$$

**$\tan x = -2$  in the range  $-360^\circ \leq x \leq 360^\circ$ .  
our answer correct to 1dp**

Principle value:  $\tan^{-1}(-2) = -63.43^\circ$



$$x = \{ -243.4^\circ, -63.4^\circ, 116.6^\circ, 296.6^\circ \}$$

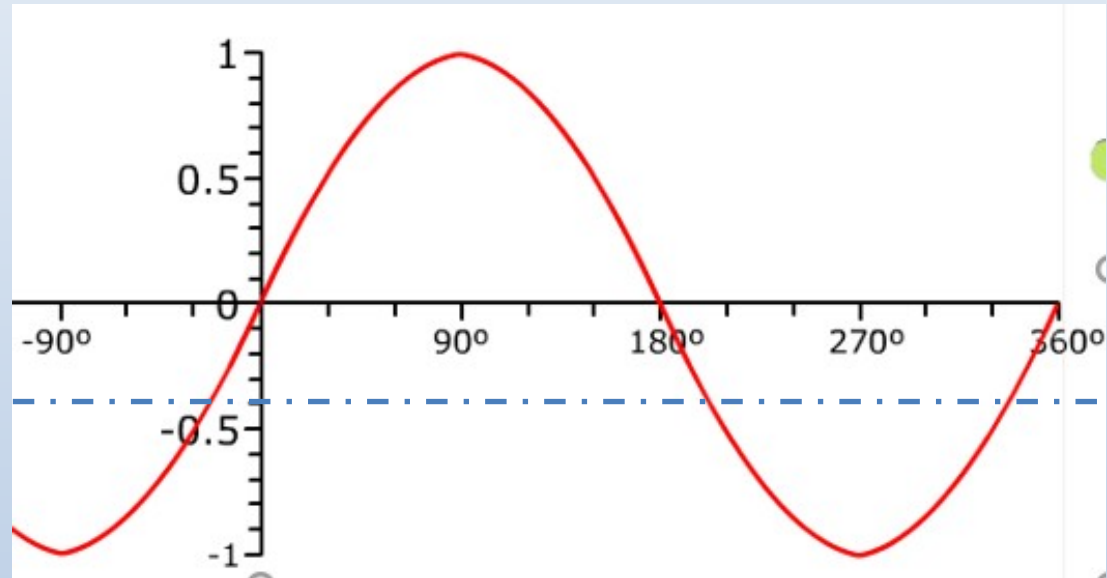
Values are separated by  $180^\circ$

# 3.1 Sine, cosine and tangent

Solve in the interval

Give your answers to 1dp.

(PV)



# 3.1 Sine, cosine and tangent

Find the values of  $\theta$  in the interval  $[0, 2\pi)$  that satisfy the equation